

Bacterial Art and GFP

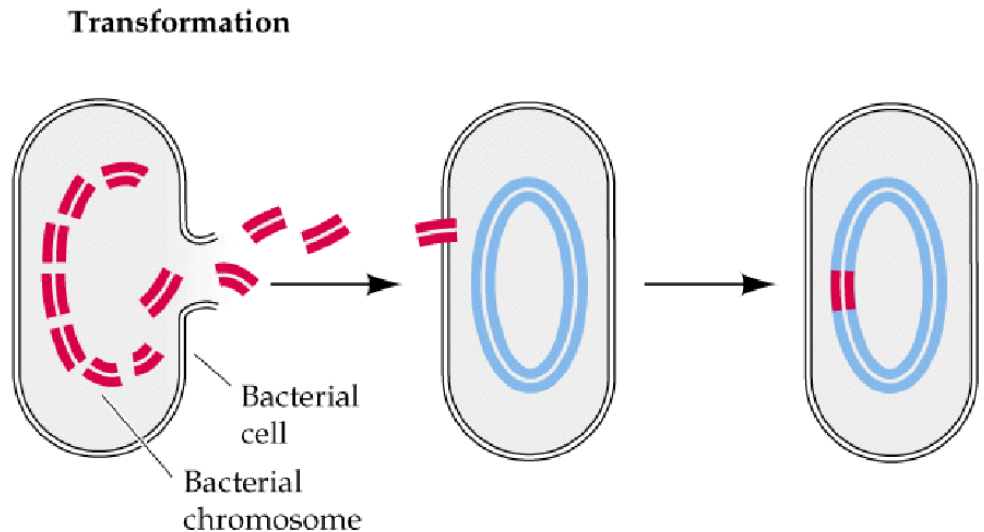
Nick Slawson

Bacteria refresher

- Bacteria are prokaryotic microorganisms (Small) found in practically all areas.
- Are shaped either as cocci (circle), bacilli (Rod), or spiral and most are either gram negative or gram positive.
- Used in research and biotechnological projects.



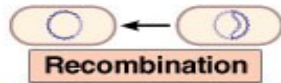
Transformation; DNA swapping



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- Bacteria, while being single celled organisms, are able to acquire new DNA and new traits.
- This process is called **transformation which is the ability for a bacteria to uptake DNA from its surroundings.**
- This allows new genes to flow between bacteria and thus new proteins and new abilities to emerge from different strains of bacteria.

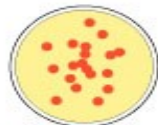
Transformation



- 1** Living encapsulated bacteria injected into mouse



- 2** Mouse died



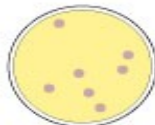
- 3** Colonies of encapsulated bacteria were isolated from dead mouse

(a)

- 1** Living nonencapsulated bacteria injected into mouse



- 2** Mouse remained healthy



- 3** A few colonies of nonencapsulated bacteria were isolated from mouse; phagocytes destroyed nonencapsulated bacteria

(b)

- 1** Heat-killed encapsulated bacteria injected into mouse



- 2** Mouse remained healthy



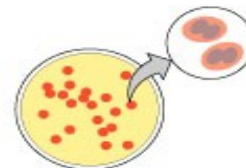
- 3** No colonies were isolated from mouse

(c)

- 1** Living nonencapsulated and heat-killed encapsulated bacteria injected into mouse



- 2** Mouse died

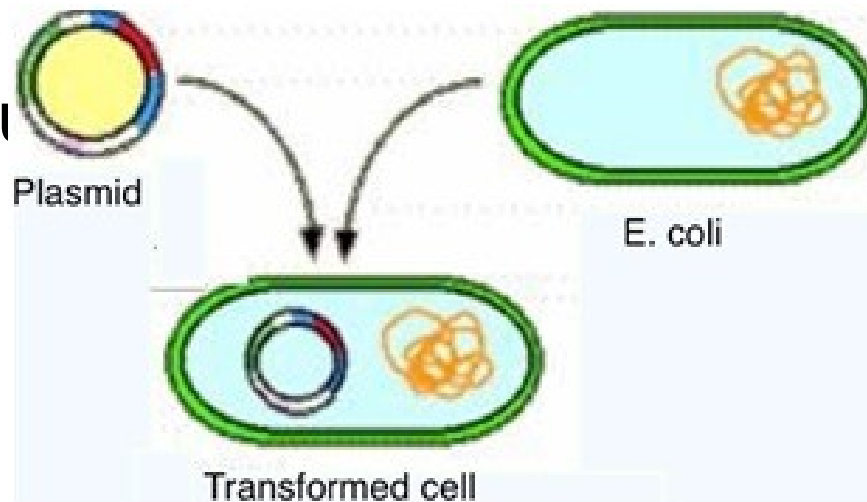


- 3** Colonies of encapsulated bacteria were isolated from dead mouse

(d)

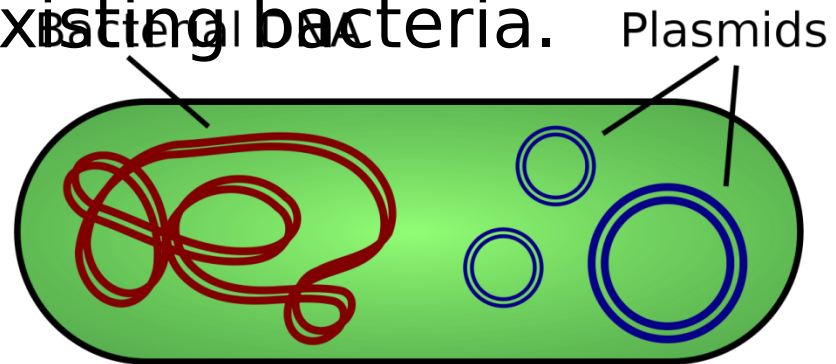
Why Transformation?

- Transformation has been an incredible tool in biology as it has allowed scientists to insert new DNA into bacterium and cause genetic changes.
- Scientists have done many novel things with this, but mostly, they use it to mass produce plasmids for future use.



Plasmids

- Plasmids are a circular pieces of DNA that bacteria have that are separate from their chromosomal DNA.
- Bacteria can transfer this to acquire new DNA to make new proteins.
- We as scientists create plasmids to move new genes into existing bacteria.



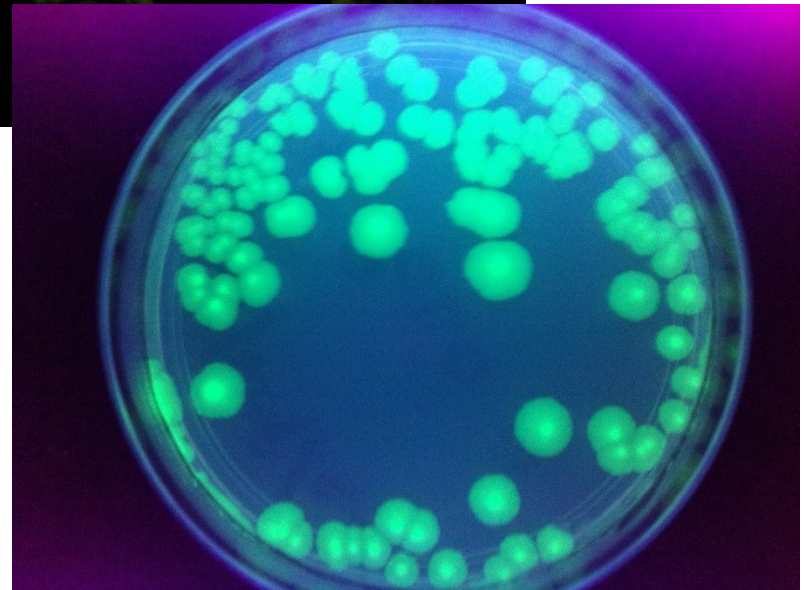
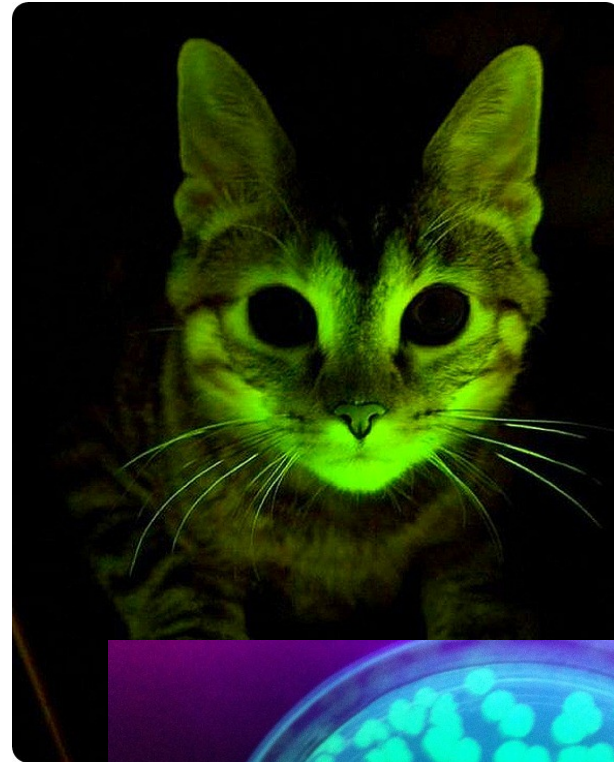
Green Fluorescent Protein (GFP)



- Green fluorescent protein is a protein that is found in species of jellyfish (first isolated from *Aequorea victoria*) that causes a bioluminescence (glowing).
- This protein, as its name states, allow the jellyfish to glow when calcium is present in the water.
- GFP has since been used as a marker of expression in molecular biology.

pGlo, and the age of Fluorescent Proteins

- Aside from GFP, there are now many fluorescent proteins to choose from in creating markers for experiments.
- Along with that, a novel plasmid was created called pGlo which is used in biotechnology as a stepping stone for genetically modified organisms.



Now its your turn!

- Today you will begin your own bacterial transformation.
- You will be able to pick a fluorescent protein and express it in *E. coli* causing it to glow the specified color.
- This will give you a glimpse into one of the most widely used techniques in science!
- It will also help you hone your sterile technique and lab skills.

Lets glow!

